U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Argythamnia blodgettii (Torr. ex Chapm) Chapm.

COMMON NAME: Blodgett's silverbush or Blodgett's wild mercury

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION:

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
__ Non-petitioned
X_Petitioned - Date petition received: May 11, 2004
_ 90-day positive - FR date:
_ 12-month warranted but precluded - FR date:
_ Did the petition request a reclassification of a listed species?
FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? _yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? _yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).
___ Listing priority change
Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): October 25, 1999

___ Candidate removal: Former LP: ___

___ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F - Range is no longer a U.S. territory.

___ I - Insufficient information exists on biological vulnerability and threats to support listing.

___ M - Taxon mistakenly included in past notice of review.

___ N - Taxon may not meet the Act's definition of "species."

___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Euphorbiaceae, Spurge Family

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, U.S.A.

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Florida, Miami-Dade and Monroe Counties, U.S.A.

LAND OWNERSHIP: *Argythamnia blodgettii* is protected at Biscayne National Park, Blue Heron Hammock in the Florida Keys Wildlife and Environmental Area (FKWEA), Camp Owaissa Bauer (Miami-Dade), Castellow Hammock Park (Miami-Dade), Deering Estate at Cutler (Miami-Dade), Dove Creek Hammock in the FKWEA, Long Pine Key in Everglades National Park (ENP), Fuchs Hammock Preserve (Miami-Dade), Klopp Tract of Lignumvitae Key Botanical State Park, Larry and Penny Thompson Park (Miami-Dade, at Richmond Pinelands), Lignumvitae Key Botanical State Park, Long Key State Park, National Key Deer Refuge, Ned Glenn Nature Preserve (Miami-Dade), Pine Ridge Sanctuary (private), Snake Creek Hammock in FKWEA, and Windley Key Fossil Reef Geological State Park (Gann, Bradley, and Woodmansee 2002). The species is "doubtfully present" at John Pennekamp Coral Reef State Park (The Institute for Regional Conservation 2004). Florida Power and Light reports that *Argythamnia blodgettii* is present on their Everglades Mitigation Bank (Florida Power and Light 2004).

Argythamnia blodgettii is not fully inventoried on remaining privately-owned pinelands in Miami-Dade County, but these are expected to be very limited in extent compared to the substantial tracts of public conservation lands, especially at Long Pine Key in ENP, the largest surviving pine rockland. The pineland at National Key Deer Refuge is also relatively large. The existing conservation lands appear more than adequate to ensure the conservation of this plant throughout its range, assuming management challenges can be met.

LEAD REGION CONTACT: Richard Gooch, 404-679-7124

LEAD FIELD OFFICE CONTACT: South Florida Ecological Services Office, David Martin, 772-562-3909 ext 230

BIOLOGICAL INFORMATION:

Species Description: "*A. blodgettii* is an erect suffrutescent perennial (woody at the base or on older stems) 1-6 dm [0.3-2 feet] tall, the stems and leaves covered with bifurcate hairs; leaves entire, oval to elliptic, sometimes slightly spatulate, 1.5-4 cm long, often colored a distinctive metallic bluish green, distinctly 3-nerved; staminate calyx 7-8 mm wide; sepals are lanceolate; petals broadly elliptic, shorter than sepals; pistillate sepals lanceolate to linear-lanceolate; petals broadly elliptic, shorter than sepals; pistillate sepals lanceolate to linear-lanceolate, 5-6 mm long; capsule 4-5 mm wide (adapted from Small 1933)." (Bradley and Gann 1999). Flowering and fruiting apparently takes place throughout the year (Bradley and Gann 1999).

Taxonomy: "The species was first described by Torrey in Chapman (1884) as *Aphora blodgettii* reporting it for 'south Florida,' naming it after John Loomis Blodgett, physician and plant collector on Key West from 1838-1852. In an 1896 revision of the genus, [Ferdinand Albin] Pax placed it in the genus *Ditaxis*. In 1897, Chapman placed it in the genus *Argythamnia* (spelling it *Argyrothamnia*). In 1903, Small placed it in the genus *Ditaxis*, writing 'In sandy soil, Key West.' In 1914, Pax placed it in synonymy under *Ditaxis fendleri*, a plant of Colombia, Venezuela, Curacao, and Trinidad. Small (1933) retained it as *Ditaxis blodgettii*, treating it as a southern Florida endemic. Subsequent authors (Webster 1967, Long and Lakela 1971, Wunderlin 1998) have retained it as a southern Florida endemic--*Argythamnia blodgettii*." (Bradley and Gann 1999).

"Synonyms: *Aphora blodgettii* Torr. Ex Chapm.; *Ditaxis blodgettii* (Torr. Ex Chapm.) Pax; *Argyrothamnia blodgettii* (Torr. Ex Chapm.) Chapm.; *Ditaxis fendleri* Pax, not (Müll. Arg.) Pax and K. Hoof." (Bradley and Gann 1999).

Habitat: "*A. blodgettii* is primarily a plant of open sunny areas in pine rockland, edges of rockland hammock, edges of coastal berm, and sometimes disturbed areas in close proximity to a natural area. Plants can be found growing from crevices on oolitic or Key Largo limestone or on sand. The pine rockland habitat where it occurs in Miami-Dade County and the Florida Keys requires periodic fires to maintain an open sunny understory with a minimum amount of hardwoods." (Bradley and Gann 1999). "*A. blodgettii* does tolerate some degree of human-induced disturbance. It can often be found along disturbed edges of pine rockland, rockland hammock, and coastal berm, or in completely scarified pine rockland. At [Windley Key Fossil Reef Geological State Park] it grows in the bottoms of abandoned rock quarries." (Bradley and Gann 1999).

Historical Range/Distribution: "*A. blodgettii* historically occurred from central and southern Miami-Dade County from Brickell Hammock (latitude ca. 25° 45.9') to southwestern Long Pine Key in Everglades National Park (latitude ca. 25° 24.2'), and throughout the Florida Keys (Monroe County and Miami-Dade County) from Totten Key (latitude 25° 22.95') south to Key

West (latitude 24° 32.52'). Historical occurrences which may no longer be extant include Brickell Hammock and Totten Key in Miami-Dade County, and Key Largo, Key Vaca, Key West and Stock Island in Monroe County." (Bradley and Gann 1999).

Current Range/Distribution: "*A. blodgettii* is currently known from central Miami-Dade County from Coral Gables (latitude 25° 43.45') and southern Miami-Dade County to southwestern Long Pine Key in Everglades National Park (latitude 25° 24.2'), and the Florida Keys from Windley Key (latitude 24° 57.008') southwest to Big Pine Key (latitude 24° 38.52'). The range in Miami-Dade County has contracted approximately 12 miles, all at the northern end of its range, the heaviest developed portion of Miami-Dade County. The range in Monroe County has contracted approximately 43 miles" (Bradley and Gann 1999).

Argythamnia blodgettii is protected at Biscayne National Park, Blue Heron Hammock in the FKWEA, Camp Owaissa Bauer (Miami-Dade), Castellow Hammock Park (Miami-Dade), Deering Estate at Cutler (Miami-Dade), Dove Creek Hammock in the FKWEA, Long Pine Key in ENP, Fuchs Hammock Preserve (Miami-Dade), Klopp Tract of Lignumvitae Key Botanical State Park, Larry and Penny Thompson Park (Miami-Dade, at Richmond Pinelands), Lignumvitae Key Botanical State Park, Long Key State Park, National Key Deer Refuge, Ned Glenn Nature Preserve (Miami-Dade), Pine Ridge Sanctuary (private), Snake Creek Hammocks in FKWEA, and Windley Key Fossil Reef Geological State Park (Gann, Bradley, and Woodmansee 2002). The species is "doubtfully present" at John Pennekamp Coral Reef State Park (Institute for Regional Conservation 2004). Florida Power and Light reports that *Argythamnia blodgettii* is present on their Everglades Mitigation Bank (Florida Power and Light 2004).

Population Estimates/Status: As of 1999 "there are approximately 18 extant occurrences [populations] of *A. blodgettii*. Four of these are in Monroe County, 14 are in Miami-Dade County . . . the exact size of several populations is unknown." (Bradley and Gann 1999). "The estimated total population of *A. blodgettii* based on a $\log_{10}$ scale is 1,001-10,000 plants. The total is probably closer to 10,000 plants. (Bradley and Gann 1999). The situation has likely remained stable since then.

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
Argythamnia blodgettii has lost a substantial amount of its former habitat. This species once occurred at the John Pennekamp Coral Reef State Park, Brickell Hammock, Key West, and Stock Island, but is now extirpated due to development. Habitat loss continues to occur in its range, and most of *Argythamnia blodgettii*'s remaining suitable habitat has been negatively altered by human activity. Pine rocklands in Miami-Dade County have been reduced to about 11 percent of their former extent (Kernan and Bradley 1996). Of the estimated historical extent of 74,000 hectares (ha) (182,780 acres), only 8,140 ha (20,106 acres) of pine rocklands remained in 1996. Outside of ENP, only about one percent of the Miami Rock Ridge pinelands have escaped clearing, and much of what is left is in small remnant blocks isolated from other natural areas (Herndon 1998). As a

result, some opportunities exist to conserve this plant on private land in Miami-Dade County, but there is little opportunity to acquire more conservation lands. Conservation of privately-owned pine rocklands in Miami-Dade County is largely a matter of County government cooperation with private landowners. The County offers incentives for landowners to maintain their natural forest communities, and remaining pine rocklands vegetation is currently being mapped using up-to-date geographic information system techniques.

Monroe County, which consists of the Keys and mostly-uninhabited mainland, is expected to experience moderate population growth. The county's past and projected population is: 1990—78,024; 2000—79,589; 2010—82,414; 2020—84,233; 2030—85,938 (Florida Legislature 2005). Average annual population growth for Monroe County, 2000-2004 is 0.62 percent per year and the trend is 1 percent per year or less (Florida Trend 2004). Monroe County has limits on development, and considerable areas of natural vegetation have been set aside. It is assumed that this plant must be conserved almost entirely on existing public and private conservation lands. Given the small number of plants known to exist and the relatively small number of sites, it is not clear that existing populations are large enough to persist.

Regional water management efforts conducted on the south Florida mainland potentially could affect *Argythamnia blodgettii* by altering the hydrology within the plant's range. However, as of 2005, there is no reason to expect that changes in water management will affect Long Pine Key in ENP other than by causing somewhat higher water levels for longer periods around the periphery of the Key. This may somewhat reduce the area of upland vegetation, but it will restore the hydrologic regime to be closer to what it was historically.

While habitat loss (especially in Miami-Dade County outside of ENP) has made this plant more vulnerable to extinction, the presence of *Argythamnia blodgettii* in conservation lands throughout its range means that this plant can be effectively conserved if management measures including prescribed fire and exotic pest plant control are successful.

B. Overutilization for commercial, recreational, scientific, or educational purposes. None known.

C. Disease or predation. None known.

D. The inadequacy of existing regulatory mechanisms. The Florida Department of Agriculture and Consumer Services designated *Argythamnia blodgettii* as endangered under Chapter 5B-40, Florida Administrative Code. This listing provides little or no habitat protection beyond the State's Development of Regional Impact process, which serves to disclose impacts from projects, but provides no regulatory protection for State-listed plants on private lands. Without local or county ordinances preventing the destruction of the plant, conservation does not occur.

E. Other natural or manmade factors affecting its continued existence. While this plant is not entirely limited to fire-maintained pine rocklands, fire suppression and exotic plant invasions threaten the survival of *Argythamnia blodgettii*. Pine rocklands need regular fires to prevent hardwood encroachment and excessive accumulations of litter. Under natural conditions, lightning fires typically occurred at 3- to 7-year intervals. With fire suppression, hardwoods eventually invade pine rocklands and shade out understory species like *Argythamnia blodgettii*. Fire suppression has reduced the size of the areas that do burn and habitat fragmentation has prevented fire from moving across the landscape in a natural way. Thus, many pine rocklands are gradually becoming tropical hardwood hammocks.

Exotic species have also altered the type of fire that occurs in pine rocklands. Historically, pine rocklands had an open low understory where natural fires remained patchy with low temperature intensity, thus sparing many native plants such as *Argythamnia blodgettii*. The current density of exotic plant overgrowth throughout *Argythamnia blodgettii's* range may no longer allow the species to be conserved through fire. Dense growth can create intense fire temperatures and longer burning periods. Pine rockland plants cannot tolerate these extreme conditions. Given the current conditions, exotic plant control may require an alternate method, such as hand chopping followed by spot herbicide treatment, which requires extensive labor and is very costly. This method may not be feasible for publicly owned lands, because of the acreage and staffing and budget constraints.

Exotic plant taxa have significantly affected pine rocklands. As a result of human activities, at least 277 taxa of exotic plants are now known to have invaded pine rocklands throughout south Florida (U.S. Fish and Wildlife Service 1999). A few of these exotic plants include the Brazilian pepper (*Schinus terebinthifolius*), Burma reed (*Neyraudia reynaudiana*), and melaleuca (*Melaleuca quinquenervia*). Old World climbing fern (*Lygodium microphyllum*) is rapidly spreading and may become a serious problem (Ferriter 2003, Volin et al. 2003).

Given the species' narrow range and the small number of individuals that exist, *Argythamnia blodgettii* is extremely vulnerable to natural disturbances, such as hurricanes.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

In 1979, Miami-Dade County enacted the Environmentally Endangered Lands Covenant Program, which gives private land owners of pine rockland habitat a tax break if they agree to not develop the property and manage it for a period of ten years (U.S. Fish and Wildlife Service 1999). The County also mounted an effective campaign to purchase natural forest communities, including tropical hammocks and pine rocklands. We do not have any formal conservation agreements with land managers. Conservation lands with Blodgett's silverbush are, without exception, managed to benefit endemic plants and/or the ecosystem they depend on. The County

funded a project to map the existing natural forest communities and inventory rare and sensitive plants species on them. Final results are expected by early 2006.

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate)

Argythamnia blodgettii is threatened by habitat loss, exacerbated by habitat degradation due to the difficulty of applying prescribed fire to pine rockland habitat, and threats from several exotic pest plants. A rapidly spreading pest plant, the Old World climbing fern, is becoming a serious problem in much of southern Florida.

For species that are being removed from candidate status:
___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11*
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Blodgett's silverbush is present at 18 sites, and in particular on the large pinelands of Long Pine Key in ENP and Big Pine Key at National Key Deer Refuge, as well as other smaller pinelands on conservation lands. If this plant's distribution were limited to the mainland, we would consider the magnitude of threat to be "high" due to serious exotic pest plant problems in the Miami-Dade urban and agricultural area, and the likely arrival of a serious new pest, Old

World climbing fern. Because the Keys are drier and perhaps less fertile, vegetation management is slightly easier. Fire return intervals are longer and the fern may prove to be less of a threat. As a result, we consider the magnitude of threats to be "moderate to low."

Imminence: Threats from exotic pest plants are already present, and they may be exacerbated in a few years, at least on the mainland, by the arrival of Old World climbing fern and/or other "new" exotics. We are maintaining the listing priority as "non-imminent" to reflect the intensive management and biological control efforts that are already aimed at Old World climbing fern and the overall quality of management on conservation lands.

Rationale for Change in Listing Priority Number (insert if appropriate): N/A

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. There are no issues, such as illegal collection or impending Federal projects, that warrant emergency listing.

DESCRIPTION OF MONITORING**:** Based upon the most recent information, there are approximately 18 extant populations of Blodgett's silverbush, including four in Monroe County and 14 in Miami-Dade County (Bradley and Gann 1999). Monitoring for this species has not been actively conducted. Although the exact sizes of the populations are not known, the Service believes that the estimated total of close to 10,000 plants (Bradley and Gann 1999) remains valid.

Populations of Blodgett's silverbush exist in the pinelands of Long Pine Key in ENP. The ENP does not currently have a formal monitoring program for Blodgett's silverbush, but it is sponsoring a project to assemble historic data on species occurrences and field work for a broad array of imperiled plant species. The ENP has an active fire management program, and the only serious threat to this plant on Long Pine Key is the rapid spread of Old World climbing fern. Regional water management efforts conducted on the south Florida mainland potentially could affect Blodgett's silverbush by altering the hydrology within the plant's range. However, as of 2005, there is no reason to expect that changes in water management will affect Long Pine Key other than by causing somewhat higher water levels for longer periods around the periphery of the Key. This may somewhat reduce the area of upland vegetation, but it will restore the hydrologic regime to be closer to what it was historically.

The Service is participating in a project to map public and many private Miami-Dade County natural forest communities for the County's geographic information system. This project will provide a list of plant species for each site and may provide new information on the status of Blodgett's silverbush. When completed in 2006, the project will enable the County to manage information on pinelands and detect changes in their extent. Preliminary information and contacts with biologists from the County suggest that most of the larger public pinelands (e.g., Larry and Penny Thompson Park) are in good condition. Other pinelands cannot be prescribed-burned because of excessive growth of vegetation. Miami-Dade County is seeking fire

management assistance from ENP to augment service provided by the Florida Division of Forestry.

The National Key Deer Refuge has an active prescribed fire program that is expected to benefit pineland understory species, including possibly Blodgett's silverbush. The Refuge does not have an active monitoring program for this plant. However, in 2004, the Service funded monitoring of plant species at the Refuge. This will help determine the extent to which Blodgett's silverbush may occur on the Refuge. Along with this monitoring, a survey is being conducted for candidate plants in the Florida Keys and this species will be documented if observed at these sites: Long Key, Lower Matecumbe Key (Klopp Tract of Lignumvitae Key Botanical State Park), Windley Key Fossil Coral Reef State Park, Plantation Key, and Vaca Key. In part, this will supplement monitoring by the Florida Park Service, which had mapped locations of all imperiled plants in the State Parks in 2001 with expectations of an update in 2006.

Overall, Blodgett's silverbush appears stable.

COORDINATION WITH STATES
Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: The State of Florida provided information on this species through its Endangered Plant Advisory Council.

Indicate which State(s) did not provide any information or comments: none

LITERATURE CITED:

Avery, G. No date. *Argythamnia blodgettii.* Page 1288 in "Unpublished field notes." 2789 pp.

Bradley, K. A. and G. D. Gann. 1999. Status summaries of 12 rockland plant taxa in southern Florida. Report submitted to U.S. Fish and Wildlife Service, Vero Beach, Fla. The Institute for Regional Conservation, 22601 S.W. 152 Ave., Miami, Florida 33170. 82 pp.

Chapman, A. W. 1884. Flora of the southeastern United States. American Book Company. New York, New York.

Chapman, A. W. 1897. Flora of the Southern United States. American Book Company. New York, New York.

Ferriter, A. 2003. *Lygodium microphyllum* in the Everglades: A report from Florida's Lygodium Task Force. Abstract, Seventh International Conference on the Ecology and Management of Alien Plant Species. Fort Lauderdale, Florida. http://199.245.200.45/pweb/document/?SOCIETY=esawssa&YEAR=2003&ID=29130

Florida Legislature, Office of Economic and Demographic Research. 2005. Total County Population, April 1, 1970-2025. http://edr.state.fl.us/population/web10.xls. Accessed October 11, 2005

Florida Power and Light. 2004. FPL's Everglades mitigation bank. http://www.fpl.com/environment/emb/contents/index.shtml Accessed June 9, 2004.

Florida Trend Magazine, Economic yearbook 2004 (vol. 46 number 13, April). Population data compiled by Woods & Poole Economics, Inc., Washington DC.

Gann, G. D., K. A. Bradley, and S. W. Woodmansee. 2002. Rare Plants of South Florida: Their History, Conservation, and Restoration. Institute for Regional Conservation, Miami, Florida. 1056 pages.

Herndon, A. 1998. Life history studies of plants endemic to South Florida. Final report to the National Park Service under cooperative agreement number CA5280-5-9019. October 1, 1995 to April 30, 1998.

Institute for Regional Ecology. 2004. Floristic inventory of South Florida. *Argythamnia blodgettii*. http://www.regionalconservation.org/ircs/database/plants/PlantPage.cfm?TXCODE=Argyblod Accessed June 9, 2004.

Kernan, C. and K. Bradley. 1996. Conservation survey of *Linum arenicola* in Dade County. A report to the U.S. Fish and Wildlife Service. Fairchild Tropical Garden, Miami, Florida.

Long, R. W. and O. Lakela. 1971. A flora of tropical Florida; a manual of the seed plants and ferns of Southern peninsular Florida. University of Miami Press; Coral Gables, Florida. 962 pp.

Pax, F. 1896. Ditaxis. In A. Engler, "Die Natürlichen Pflanzenfamilien." W. Engelmann, Leipzig.

Pax, F. 1914. Ditaxis. In A. Engler. "Das Pflanzenreich." W. Engelmann, Leipzig.

Small, J. K. 1903. Flora of the southeastern United States. Published by the author. New York, New York.

Small, J. K. 1933. Manual of the southeastern flora. Univ. of North Carolina Press, Chapel Hill, North Carolina. 1554 pp.

Snyder, J. R., A. Herndon, and W. B. Roberson, Jr. 1990. South Florida rocklands. Pages 230-277 in R. L. Myers and J. J. Ewel, eds. Ecosystems of Florida. University of Central Florida Press. Orlando, Florida.

The Nature Conservancy, Conservation Science Division, in cooperation with The Association for Biodiversity Information, and the International Network of Natural Heritage Programs and Conservation Data Centers. 1999. Biodiversity Conservation Data Source

(BioSource). Arlington, Virginia.

U.S. Census Bureau. 1998. State and Metropolitan Area Data Book 1997-1998.

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Atlanta, Georgia. 2172 pp.

Volin, J. C., M. S. Lott, J. D. Muss, D. Owen, and J. Stewart. 2003. The physiological ecology of the non-indigenous invasive *Lygodium microphyllum* in South Florida. Abstract, Seventh International Conference on the Ecology and Management of Alien Plant Species. Fort Lauderdale, Florida. http://199.245.200.45/pweb/document/?SOCIETY=esawssa&YEAR=2003&ID=29504

Webster, G. L. 1967. Agythamnia. In "Genera of the Euphorbiaceae." Journal of the Arnold Arboretum 48: 364-366.

Wunderlin, R. P. 1988. Guide to the vascular plants of Florida. University Press of Florida. Gainesville, Florida.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005
Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: South Florida (Vero Beach) Field Office